

CENTRAL FAX CENTER

MAR 13 2008

Appl. No. 10/519,107

Reply to Office Action of October 17, 20007

Amendments to the Specification:

Please replace the paragraph on page 3, 3<sup>rd</sup> paragraph, with the following amended paragraph:

Since an organic EL element, employing phosphorescence through the excited triplet, was reported by ~~Princeton~~ Princeton University (see Non-Patent Document 1), studies on materials emitting phosphorescence at room temperature have been actively carried out (see Non-Patent Document 2 and Patent Document 4).

Please replace the paragraph on page 5, 4th paragraph, with the following amended paragraph:

An external ~~quantum~~ quantum efficiency of around 20%, which is a theoretical threshold, has been attained in green light emission in a lower current region (a lower luminance region), however, the theoretical threshold has not been attained in a higher current region (a higher luminance region). Further, a sufficient emission efficiency has not been attained in other color emission, where further improvement is required. With respect to the practical use in the near future, required is an organic EL element which efficiently emits light with high luminance at a lower power.

Appl. No. 10/519,107  
Reply to Office Action of October 17, 20007

Please replace the paragraph bridging pages 32-36, with the following amended paragraph:

In Formula (1), examples of a substitute represented by  $R_{101}$  include: alkyl groups (for example, a methyl group, an ethyl group, a propyl group, an isopropyl group, a tert-butyl group, a pentyl group, a hexyl group, an octyl group, a dodecyl group, a tridecyl group, a tetradecyl group and a pentadecyl group); cycloalkyl groups (for example, a cyclopentyl group and a cyclohexyl group); alkenyl groups (for example, a vinyl group and an allyl group); alkynyl groups (for example, an ethynyl group and a propargyl group); aryl groups (for example, a phenyl group and a naphthyl group); aromatic heterocyclic groups (for example, a furyl group, a thienyl group, a pyridyl group, a pyridazinyl group, a pyrimidinyl group, a pyrazinyl group, the triazinyl group, an imidazolyl group, a pyrazolyl group, a thiazolyl group, a quinazolinyl group and a phthalazinyl group), heterocyclic groups (for example, a pyrrolidyl group, an imidazolidyl group, a morpholyl group and an oxazolidyl group), alkoxyl groups (for example, a methoxy group, an ethoxy group, a propyloxy group, a pentyloxy group, a hexyloxy group, an octyloxy group and a

Appl. No. 10/519,107  
Reply to Office Action of October 17, 20007

dodecyloxy group), cyclo alkoxyl groups (for example, a cyclopentyloxy group, a cyclohexyloxy group), aryloxy groups (for example, a phenoxy group and a naphthyloxy group), alkylthio groups (for example, a methylthio group, an ethylthio group, a propylthio group, a pentylthio group, a hexylthio group, an octylthio group and a dodecylthio group), cycloalkylthio groups (for example, a cyclopentylthio group and a cyclohexylthio group), arylthio groups (for example, a phenylthio group and a naphthylthio group), alkoxy carbonyl groups (for example, a methyloxycarbonyl group, an ethyloxycarbonyl group, a butyloxycarbonyl group, an octyloxycarbonyl group and a dodecyloxycarbonyl group), aryloxycarbonyl groups (for example, a phenyloxycarbonyl group and a naphthyloxycarbonyl group), sulfamoyl groups (for example, the aminosulfonyl group, a methylaminosulfonyl group, a dimethylaminosulfonyl group, a butylaminosulfonyl group, a hexylaminosulfonyl group, a cyclohexylaminosulfonyl group, an octylaminosulfonyl group, a dodecylaminosulfonyl group, a phenylaminosulfonyl group, a naphthylaminosulfonyl group and 2-pyridylaminosulfonyl group), acyl groups (for example, an acetyl group, an ethylcarbonyl group, a propylcarbonyl group, a pentylcarbonyl group, a

Appl. No. 10/519,107

Reply to Office Action of October 17, 20007

cyclohexylcarbonyl group, an octylcarbonyl group, 2-ethylhexylcarbonyl group, a dodecylcarbonyl group, a phenylcarbonyl group, a naphthylcarbonyl group and a pyridyl carbonyl group), acyloxy groups (for example, an acetyloxy group, an ethylcarbonyloxy group, a butylcarbonyloxy group, an octylcarbonyloxy group, a dodecylcarbonyloxy group and a phenylcarbonyloxy group), amide groups (for example, a methylcarbonylamino group, an ethylcarbonylamino group, a dimethylcarbonylamino group, a propylcarbonylamino group, a pentylcarbonylamino group, a cyclohexylcarbonylamino group, 2-ethylhexylcarbonylamino group, an octylcarbonylamino group, a dodecylcarbonylamino group, a phenylcarbonylamino group, a naphthylcarbonylamino group, etc.), carbamoyl groups (for example, the aminocarbonyl group, a methylaminocarbonyl group, a dimethylaminocarbonyl group, a propylaminocarbonyl group, a pentylaminocarbonyl group, a cyclohexylaminocarbonyl group, an octylaminocarbonyl group, 2-ethylhexylaminocarbonyl group, a dodecylaminocarbonyl group, a phenylaminocarbonyl group, a naphthylaminocarbonyl group and 2-pyridylaminocarbonyl group), ureido groups (for example, a methylureido group, an ethylureido group, a pentylureido group, a cyclohexylureido group, an

Appl. No. 10/519,107

Reply to Office Action of October 17, 20007

octylureido group, a dodecylureido group, a phenylureido group naphthylureido group and 2-pyridylaminoureido group), sulfinyl groups (for example, a methylsulfinyl group, an ethylsulfinyl group, a butylsulfinyl group, a cyclohexylsulfinyl group, 2-ethylhexylsulfinyl group, a dodecylsulfinyl group, a phenylsulfinyl group, a naphthylsulfinyl group and 2-pyridylsulfinyl group), alkylsulfonyl groups (for example, a ~~methylsulfonylamino~~ methylsulfonylamino group, an ethylsulfonyl group, a butylsulfonyl group, a cyclohexylsulfonyl group, 2-ethylhexylsulfonyl group and a dodecylsulfonyl group), arylsulfonyl groups (a phenylsulfonyl group, a naphthylsulfonyl group and 2-pyridylsulfonyl group), amino groups (for example, an amino group, an ethylamino group, a dimethylamino group, a butylamino group, a cyclopentylamino group, 2-ethylhexylamino group, a dodecylamino group, an anilino group and a naphthylamino group, 2-pyridylamino group), halogen atoms (for example, a fluorine atom, a chlorine atom and a bromine atom), fluoride hydro fluoro carbon groups (for example, a fluoromethyl group, a trifluoromethyl group, a pentafluoroethyl group and a pentafluorophenyl group), a cyano group, a nitro group, a hydroxy group, a mercapto group, silyl groups (for example, a

Appl. No. 10/519,107

Reply to Office Action of October 17, 20007

trimethylsilyl group, a triisopropylsilyl group, a triphenylsilyl group and a phenyldiethylsilyl group).

Please replace the paragraph bridging pages 46 and 47, with the following amended paragraph:

Examples of an arylene group represented by Ar<sub>1</sub> or Ar<sub>2</sub> of Formula (16) include: an o-phenylene group, a m-phenylene group, a p-phenylene group, a naphthalenediyl group, an anthracenediyl group, a naphthacenediyl group, a pyrenediyl group, a naphthyl-naphthalenediyl group, a biphenyldiyl groups (for example, a 3,3'-biphenyldiyl group and a 3,6-biphenyldiyl group), a terphenyldiyl group, a quaterphenyldiyl group, a ~~kinkphenyldiyl~~ quinquephenyldiyl group, the sexiphenyldiyl group, the septiphenyldiyl group, an octiphenyldiyl group, the noviphenyldiyl group and a deciphenyldiyl group. The above mentioned arylene group may further have a substituent which will be described later.

Please replace the last paragraph on page 48, with the following amended paragraph:

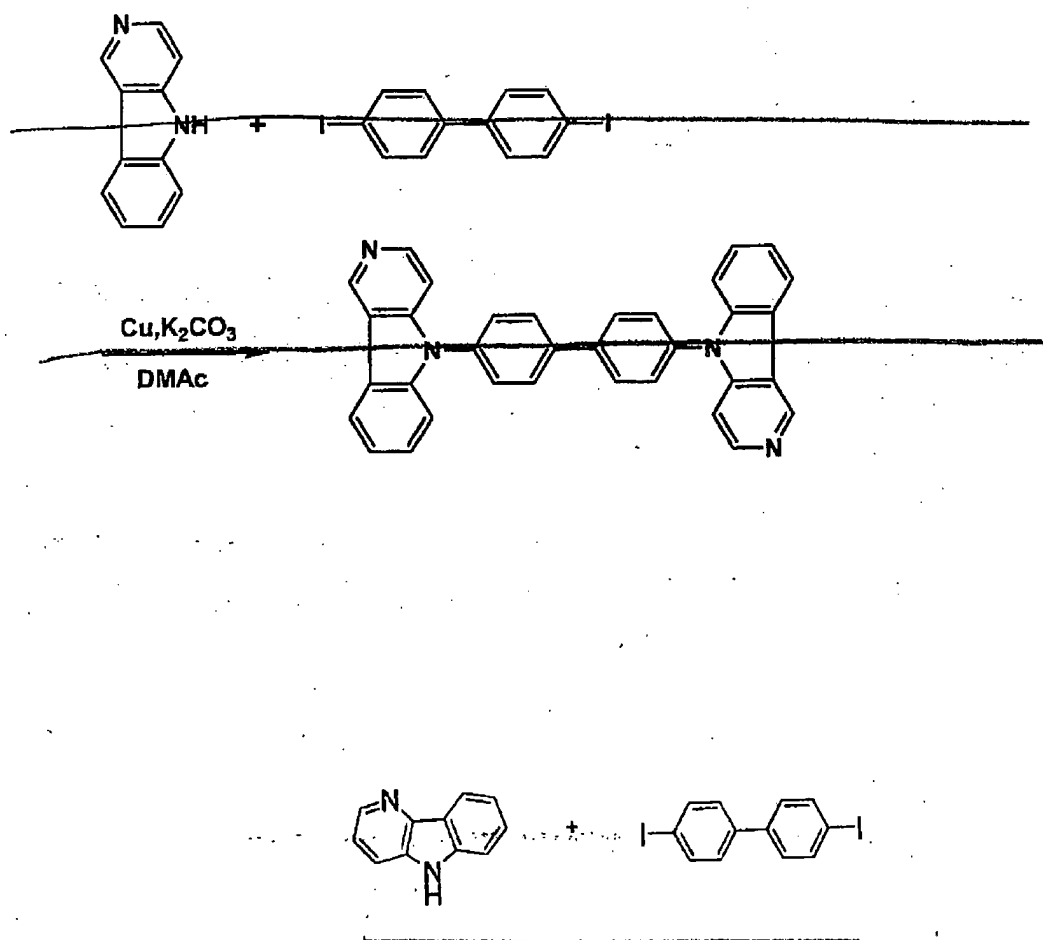
In the following, the compounds relating to the ~~peresent~~

Appl. No. 10/519,107

Reply to Office Action of October 17, 20007

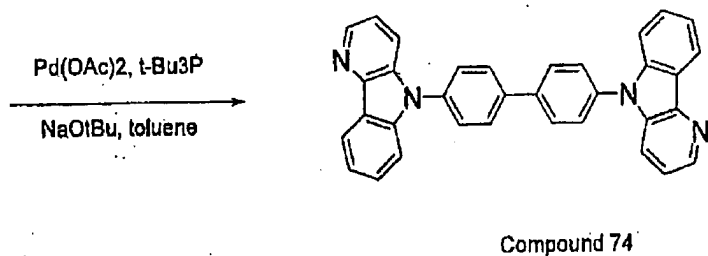
present invention or specific examples of the compounds relating  
to the present invention will be shown, however, the present  
invention is not limited thereto:

Please replace the next to last paragraph on page 86, which  
is the reaction scheme, with the following amended figure:

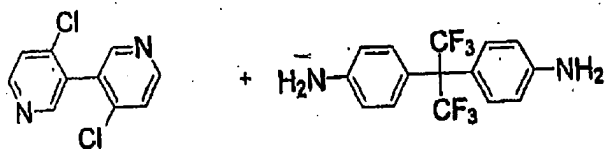
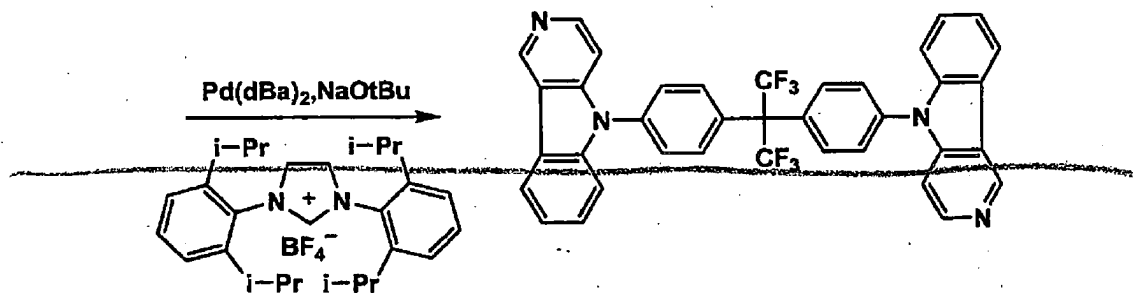
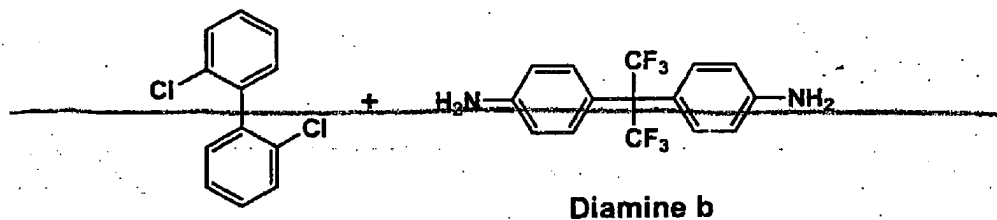


Appl. No. 10/519,107

Reply to Office Action of October 17, 20007



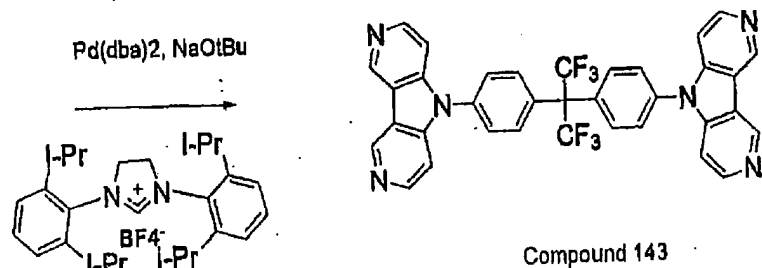
Please replace the second paragraph on page 91, (the reaction scheme) with the following amended paragraph:





Appl. No. 10/519,107

Reply to Office Action of October 17, 20007



Please replace the paragraph bridging pages 114 - 115, with the following amended paragraph:

Examples of the material used in the electron transporting layer include a nitro-substituted fluorene derivative, a diphenylquinone derivative, a thiopyran dioxide derivative, a carbodiimide, a ~~fluorenylidene~~ fluorenylidene methane derivative, an anthraquinodimethane, an anthrone derivative, and an oxadiazole derivative. Moreover, a thiadiazole derivative which is formed by substituting the oxygen atom in the oxadiazole ring of the foregoing oxadiazole derivative with a sulfur atom, and a quinoxaline derivative having a quinoxaline ring known as an electron withdrawing group are usable as the electron transporting material.

Appl. No. 10/519,107  
Reply to Office Action of October 17, 20007

Please replace the third paragraph on page 140, with the following amended paragraph:

The results are given in the following table. Each value of ~~luminance, external quantum efficiency~~ and storage stability given in the following table was expressed as a relative value when each value for Organic EL Element Nos. 3-6 was set as 100.

Please replace the paragraph bridging pages 140 - 141, with the following amended paragraph:

As is clear in the above table, the organic EL elements of the present invention exhibited ~~higher luminance values, higher external quantum efficiency values~~ and higher storage stability compared to those of the comparative organic EL element. Among these, compounds relating to Formula (1-12) having molecular weight of 450 or more gave specifically good results.

Please replace the second paragraph on page 142, with the following amended paragraph:

The results are given in the following table. Each value of ~~luminance, external quantum~~ given in the following table was

Appl. No. 10/519,107  
Reply to Office Action of October 17, 20007

expressed as a relative value when each value for Organic EL Element 4-6 was set as 100.

Please replace the third paragraph on page 142, (paragraph after table), with the following amended paragraph:

As is clear in the above table, the organic EL elements of the present invention exhibited ~~higher luminance, higher external quantum efficiency and~~ longer 50 °C driving lives compared to those of the comparative organic EL element. Among these, compounds relating to Formula (1-13) having molecular weight of 450 or more gave specifically good results..

Please replace the second paragraph on page 144, (paragraph after table, with the following amended paragraph:

As is clear in the above table, the organic EL elements of the present invention exhibited ~~higher luminance, higher external quantum efficiency and~~ longer initial life-time compared to those of the comparative organic EL element. Among these, compounds relating to Formula (1-11) gave specifically good results.

Appl. No. 10/519,107

Reply to Office Action of October 17, 20007

Please replace the last paragraph on page 145, with the following amended paragraph:

The results are given in the following table. ~~Each value of measured luminance, external quantum given in the following table was expressed as a relative value when each value for Organic EL Element 6-6 was set as 100.~~

Please replace the first paragraph under the table, on page 146, with the following amended paragraph:

As is clear in the above table, the organic EL elements of the present invention exhibited ~~higher luminance, higher external quantum efficiency and~~ superior driving voltage characteristics compared to those of the comparative organic EL element. Among these, compounds relating to Formulae (1-1) to (1-4) gave specifically good results.

Please replace the second paragraph on page 147, with the following amended paragraph:

The results are given in the following table. Each value ~~of measured luminance, external quantum efficiency~~ given in the following table was expressed as a relative value when each value

Appl. No. 10/519,107  
Reply to Office Action of October 17, 20007

for Organic EL Element 7-6 was set as 100.

Please replace the third paragraph on page 147, (paragraph after table) with the following amended paragraph:

As is clear in the above table, the organic EL elements of the present invention exhibited ~~higher luminance, higher external quantum efficiency and~~ superior storage stability compared to those of the comparative organic EL element. Among these, compounds relating to Formula (1-12) having molecular weight of 450 or more gave specifically good results.

Please replace the last paragraph on page 148, with the following amended paragraph:

The results are given in the following table. Each value of measured ~~luminance, external quantum efficiency and~~ 50 °C driving life given in the following table was expressed as a relative value when each value for Organic EL Element 8-6 was set as 100.

Please replace the first paragraph on page 149, (paragraph after table) with the following amended paragraph:

Appl. No. 10/519,107

Reply to Office Action of October 17, 20007

As is clear in the above table, the organic EL elements of the present invention exhibited ~~higher luminance, higher external quantum efficiency and~~ longer 50 °C driving lives compared to those of the comparative organic EL element. Among these, compounds relating to Formula (1-13) having molecular weight of 450 or more gave specifically good results.

Please replace the second paragraph on page 150, with the following amended paragraph:

The results are given in the following table. Each value of ~~measured luminance, external quantum efficiency and~~ initial life given in the following table was expressed as a relative value when each value for Organic EL Element 9-6 was set as 100.

Please replace the third paragraph on page 150, (paragraph after table) with the following amended paragraph:

As is clear in the above table, the organic EL elements of the present invention exhibited ~~higher luminance, higher external quantum efficiency and~~ longer initial lives compared to those of the comparative organic EL element. Among these, compounds

Appl. No. 10/519,107  
Reply to Office Action of October 17, 20007

relating to Formula (1-11) gave specifically good results.

Please replace the last paragraph on page 151 with the following amended paragraph:

The results are given in the following table. ~~Each value of measured luminance and external quantum efficiency given in the following table was expressed as a relative value when each value for Organic EL Element 10-6 was set as 100.~~ Each driving voltage was obtained as a voltage difference between the voltage of each organic EL element and that of Organic EL Element No. 10-6.

Please replace the first paragraph on page 152, (paragraph after table) with the following amended paragraph:

As is clear in the above table, the organic EL elements of the present invention exhibited ~~higher luminance, higher external quantum efficiency and~~ superior driving voltages compared to those of the comparative organic EL element. Among these, compounds relating to Formulae (1-1) to (1-4) gave specifically good results.